Calculus JEOPARDY

Sample

by Stu Schwartz

Go Straight	Things Change	Hit the Slopes
100 (MC)	Calculator 100 (MC)	100 (MC)
200 (MC)	Calculator 200 (FR)	200 (MC)
300 (MC)	300 (MC)	300 (MC)
400 (FR)	Calculator 400 (MC)	Calculator 400 (MC)
Calculator 500 (MC)	500 (FR)	500 (MC)

In the purchased version, the game board has 6 categories and is interactive, allowing you to click on category and money amount to see the answers. In this sample just scroll through the document.

Go Straight – 100

- A particle moves along the x-axis so that its velocity is given by $v(t) = e^{2t} - 2t$. If the particle is at the origin at $t = 0$, the position of the particle at $t = 1$

A) $\dfrac{e^2}{2} - 1$

B) $\dfrac{e^2 - 1}{2}$

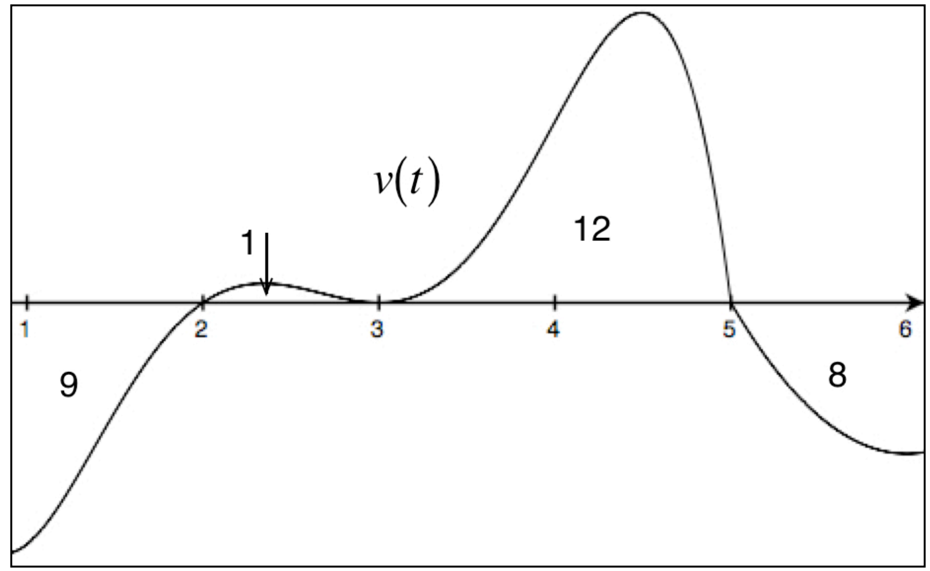
C) $\dfrac{e^2 - 3}{2}$

D) $2e^2 - 3$

E) $2e^2 - 1$

Go Straight– 200

- A particle is moving along the y-axis. Its velocity is shown in the figure below with the indicated areas. On $1 \le t \le 6$ the number of times the particle passes the position on the y-axis it occupied at $t = 1$



A) Once

B) Twice

C) 3 times

D) 4 times

E) Never

Go Straight – 300

- A particle moves along the *x*-axis such that its velocity is given by $v(t) = \dfrac{-\sin(2t\pi)}{t}$. The movement of the particle at $t = \dfrac{1}{4}$

A) Moving right and speeding up

B) Moving right and slowing down

C) Moving left and speeding up

D) Moving left and slowing down

E) Stopped

Go Straight – 400

- The velocity of a police car moving along a straight highway is modeled by a differentiable function $v(t)$, where the position x is measured in miles and time t is measured in hours. Selected values of $v(t)$ are given in the table below. The police car is at mile marker $x = 15$ when $t = 0$. Using a trapezoidal sum with 4 subintervals, the distance that the police car traveled over 12 hours

t (hours)	0	2	5	9	12
$v(t)$ (mph)	20	50	-20	30	-10

Go Straight – 500

- (Calculator allowed) A particle moves along the *x*-axis with position at time *t* given by $x(t) = e^{-t}(\sin t - \cos t)$ for $0 \le t \le 2\pi$. The distance between the particle's position when it is furthest to the left and furthest to the right

A) 0.199

B) 0.217

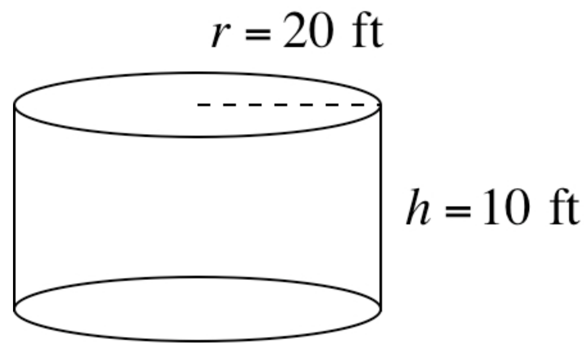
C) 0.792

D) 1.009

E) 1.208

Things Change - 100

(Calculator allowed) A cylindrical gas tank is in the shape of the figure to the right. Gas is flowing into the tank at the rate of 1,000 gallons per minute. The speed that the height of the gas in the tank is changing when the height of the gas is 8 feet high. (1 gallon = .133 ft^3)



A) $.013\dfrac{\text{ft}}{\text{min}}$

B) $.106\dfrac{\text{ft}}{\text{min}}$

C) $.529\dfrac{\text{ft}}{\text{min}}$

D) $1.045\dfrac{\text{ft}}{\text{min}}$

E) $10.45\dfrac{\text{ft}}{\text{min}}$

Things Change - 200

- At 12:00 noon, there are 575 people in a popular water park. The chart below shows the rate at people entering the park in people per hour and people leaving the park in people per hour at various times of the day. Using trapezoidal approximations, the number of people in the park at 5:00 PM

Time of day	12 noon	2 PM	3 PM	5 PM
People entering (people per hour)	380	450	200	30
People leaving (people per hour)	100	80	420	620

Things Change - 300

- Laurel is 4 miles east of an intersection and Hardy is 3 miles north of the intersection. Laurel is traveling *towards* the intersection at 40 mph while Hardy is traveling *away* from the intersection at 20 mph. The speed that the distance between them is changing

A) decreasing at 2 mph

B) increasing at 4.4 mph

C) decreasing at 4 mph

D) decreasing at 5 mph

E) increasing at .14 mph

Things Change - 400

- In a national park, a census of deer was taken every year from 1990 to 2004. The deer population over that period was modeled by the function $f(t)=\dfrac{(2t)^{3/2}}{3}+40\sin(.5t)-15t+1000$ where t represents years since 1990 ($t = 0$ means 1990, $t = 1$ means 1991 … $t = 14$ means 2004, etc) . The year that the deer population changed the most rapidly

A) 1990

B) 1991

C) 1997

D) 2001

E) 2002

Things Change - 500

- At time $t \geq 0$, the volume of a cube is increasing at a rate proportional to one of its sides. At $t = 0$, a side of the cube is 2 and at $t = 3$, a side of the cube is 4. The side of the cube when $t = 8$

A) 5.333

B) 6

C) $\sqrt{18}$

D) 12

E) 36

Hit the Slopes - 100

- The slopes of the following functions from highest to lowest at $x = e$

I) $y = \sin^{-1}(e - x)$

II) $y = \dfrac{x^3 + 1}{x + 1}$

III) $y = \ln\left(\dfrac{2x + e}{x + 2e}\right)^2$

A) I, II, III

B) III, II, I

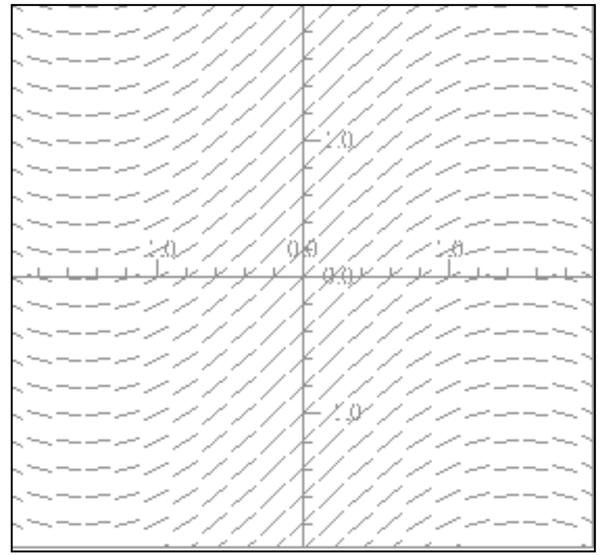
C) III, I, II

D) II, I, III

E) II, III, I

Hit the Slopes - 200

- The possible equation for the following slope field



A) $y' = \sin x$

B) $y' = \cos x$

C) $y' = x^3$

D) $y' = \sqrt[3]{x}$

E) $y' = \dfrac{1}{1+x^2}$

Hit the Slopes - 300

- Using the following table, the slopes of the given functions are found at $x = 1$. The number of these slopes that are positive in value

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	4	2	3	-2
2	-4	-5	2	3

I. $y = f(x)g(x)$

II. $y = \dfrac{1}{f^2(x)}$

III. $y = \sqrt{f(x) + g(x)}$

IV. $y = f(g(x))$

A) 4

B) 3

C) 2

D) 1

E) None

Hit the Slopes - 400

- (Calculator allowed) The maximum slope of $y = x\cos x$ on $[0, 2\pi]$ is

  A) 1.861

  B) 3.519

  C) 3.809

  D) 4.712

  E) 5.087

Hit the Slopes - 500

- A function $f(x)$ passing through the origin has slope at every point given by the function $y = \frac{-2x}{e^{2y}}$. The domain of $f(x)$

A) $(-\infty, \infty)$

B) $x > 2$

C) $-2 < x < 2$

D) $-\frac{\sqrt{2}}{2} < x < \frac{\sqrt{2}}{2}$

E) $(0, \infty)$