Note: This assignment will be evaluated after the deadline passes. You will get your score 48 hrs after the deadline. Until then the score will be shown as Zero.

1) Match the functions in Column A with the corresponding (signed) area between its graph and the interval $[-1, 1]$ on the X-axis in column B and the images of their graphs and the highlighted region corresponding to the area computed in Column C, given in Table M2W3G1. ***1 point***

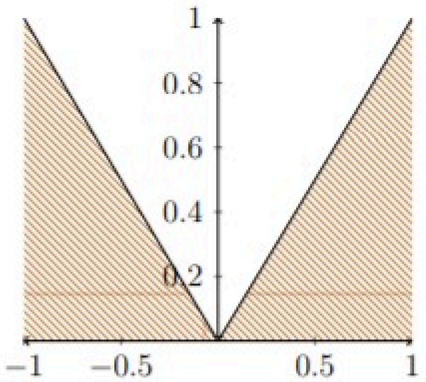
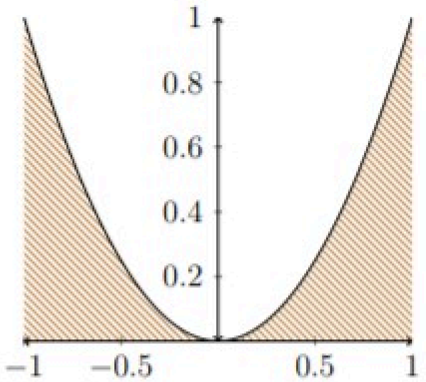
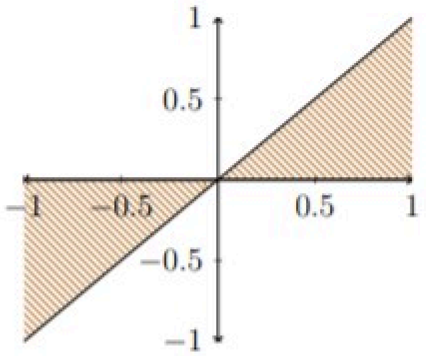
	Functions (Column A)		Area under the curve (Column B)		Graphs (Column C)
i)	$f(x) = x$	a)	$\frac{2}{3}$	1)	
ii)	$f(x) = \lvert x \rvert$	b)	0	2)	
iii)	$f(x) = x^2$	c)	1	3)	

Table: M2W3G1

- [ ] i) $\rightarrow$ b) $\rightarrow$ 1), iii) $\rightarrow$ a) $\rightarrow$ 2).
- [x] i) $\rightarrow$ b) $\rightarrow$ 3), ii) $\rightarrow$ c) $\rightarrow$ 1).
- [x] ii) $\rightarrow$ c) $\rightarrow$ 1), iii) $\rightarrow$ a) $\rightarrow$ 2).

- [ ] i) $\rightarrow$ b) $\rightarrow$ 1), ii) $\rightarrow$ c) $\rightarrow$ 3), iii) $\rightarrow$ a) $\rightarrow$ 2).

2) A cylinder of radius x and height $2h$ is to be inscribed in a sphere of radius R centered at O as shown in Figure M2W3G1 **_1 point_**

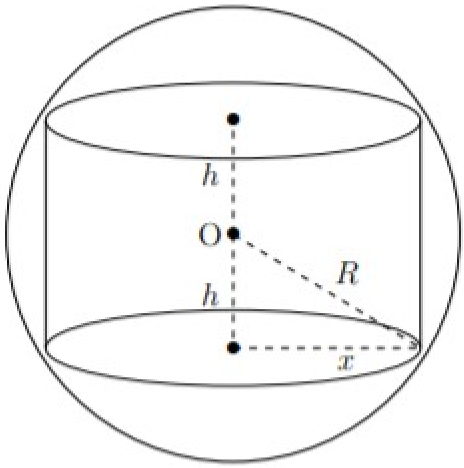


Figure M2W3G1

The volume of such a cylinder is given by $V = 2\pi x^2 h$ and the surface area of the outer curved surface is given by $S = 4\pi xh$. Choose the set of correct options.

- [ ] The cylinder has maximum volume amongst all cylinders which can be inscribed when $h = R$.
- [ ] The cylinder has maximum volume amongst all cylinders which can be inscribed when $h = \sqrt{3}R$.
- [x] The cylinder has maximum volume amongst all cylinders which can be inscribed when $h = \frac{R}{\sqrt{3}}$.
- [ ] The cylinder has maximum surface area of its curved surface, amongst all cylinders which can be inscribed, when $h = 2R$.
- [x] The cylinder has maximum surface area of its curved surface, amongst all cylinders which can be inscribed, when $h = \frac{R}{\sqrt{2}}$.
- [ ] The cylinder has maximum surface area of its curved surface, amongst all cylinders which can be inscribed, when $h = \sqrt{2}$.

3) Which of the curves in the following figures enclose a negative area on the X axis in the interval $[0, 1]$? **_1 point_**

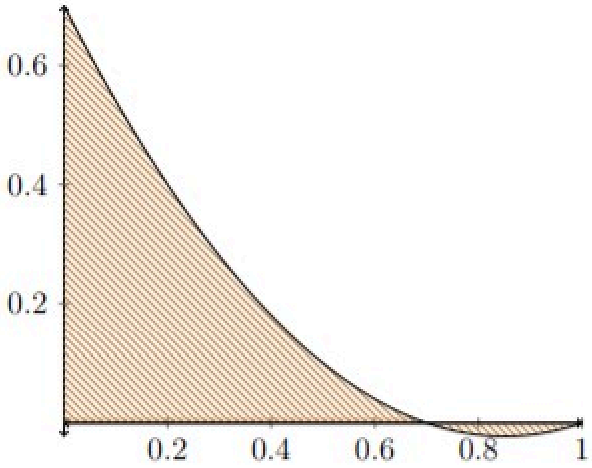


Figure: Curve 1

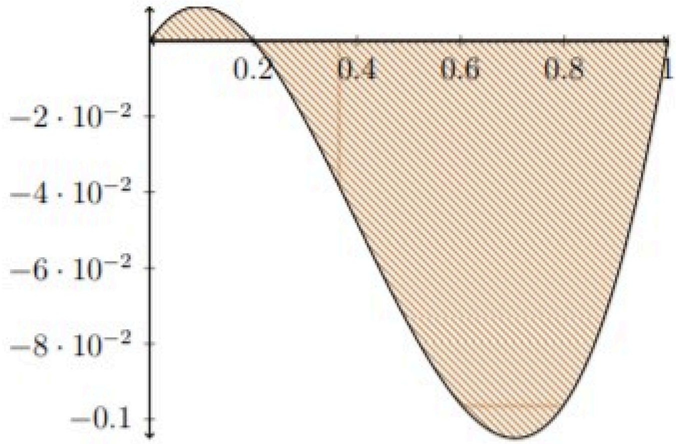


Figure: Curve 2

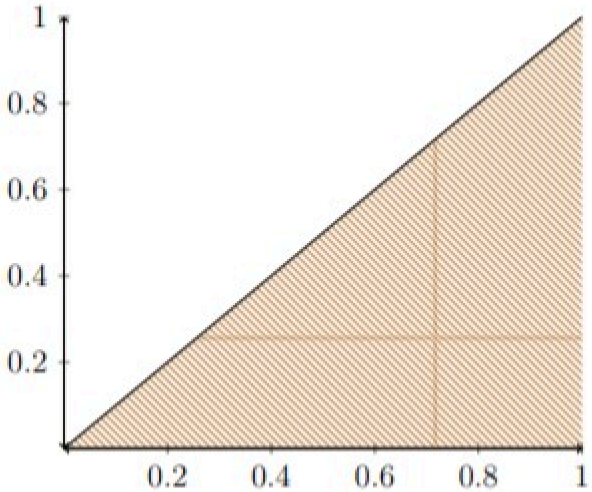


Figure: Curve 3

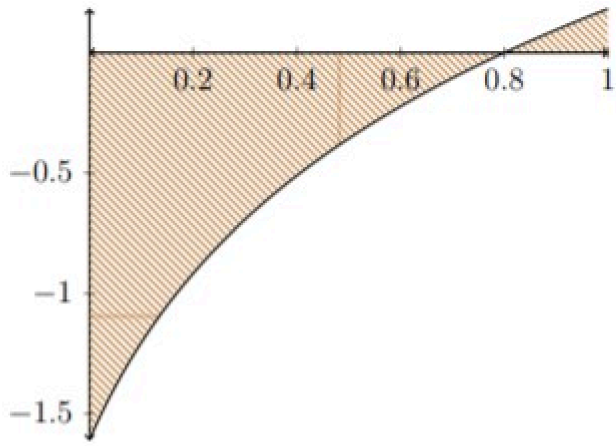


Figure: Curve 4

- [ ] Curve 1
- [x] Curve 2
- [ ] Curve 3
- [x] Curve 4

Suppose $f_1(x) = x^3$ and $f_2(x) = x$ denote the profits of Company A and Company B, respectively, throughout 1 year (the beginning of the year is denoted by $x = 0$ and the ending denoted by $x = 1$). The predicted profits of Company A and Company B in the same year are given by the functions $g_1(x) = \sqrt{x}$ and $g_2(x) = e^x$, respectively. The curves represented by the functions f_1 and g_1 are shown in Figure M2W3G2, and the curves represented by the functions f_2 and g_2 are shown in Figure M2W3G3.

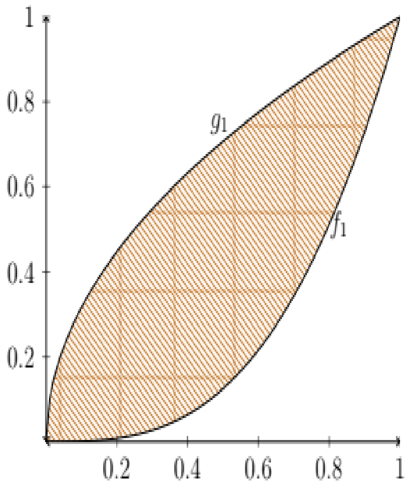


Figure: M2W3G2

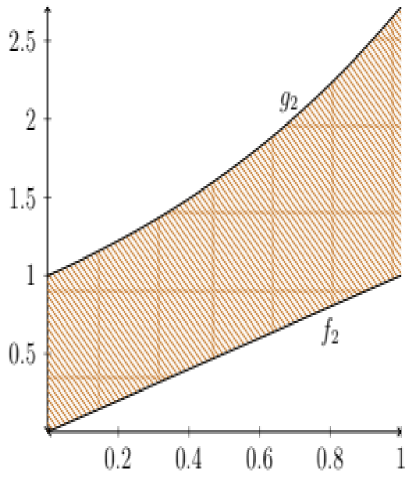


Figure: M2W3G3

Suppose the area of the region bounded by the two curves (the original curve and the predicted curve) in the interval $[0, 1]$is defined to be the error in prediction.
Using the information above, answer the following questions.

4) What will the absolute difference between the minimum values of f_2 and g_2 in the interval $[0, 1]$ be?

1

1 point

5) Choose the correct options from the following.

1 point

- [x] The error in prediction for company A is $\frac{5}{12}$.
- [ ] The error in prediction for company A is $\frac{11}{12}$.
- [ ] The error in prediction for company A is more than that for company B.
- [x] The error in prediction for company B is more than that for company A.
- [ ] The error in prediction for Company A and Company B, cannot be compared using the given information.

6) Let $f(x) = x^3 - 3x + 33$. What is the local minimum value of f attained at a critical point?

31

1 point

7) Let $f(x) = 13x^2 + \frac{36}{6}, 0 \leq x \leq 6$. The estimated area obtained by dividing the interval into 3 sub-intervals of equal length and the left end points of the sub-intervals for height of the rectangles is (in square units)

556

1 point

8) Let

$$f(x) = \begin{cases} -5x+1 & 0 \leq x \leq 10 \\ x^2 & 10 < x \leq 20 \end{cases}$$

What is the global minimum of f on $[0, 20]$

-49

1 point

9) If $x - y = 10$, find the least value of $2xy$.

-50

1 point