
Instructions

1. Write your *Name*, *PID*, *Section*, and *Exam Version* on the front of your Blue Book.
 2. No calculators or other electronic devices are allowed during this exam.
 3. You may use one page of notes, but no books or other assistance during this exam.
 4. Read each question carefully, and answer each question completely.
 5. Write your solutions clearly in your Blue Book.
 - (a) Carefully indicate the number and letter of each question and question part.
 - (b) Present your answers in the same order as they appear in the exam.
 - (c) Start each numbered problem on a new side of a page.
 6. Show all of your work. No credit will be given for unsupported answers, even if correct.
 7. Write Name & PID on this exam sheet and return inside front cover of your Blue Book.
-

0. (1 point) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.
1. (6 points) Let $f(x) = x(x+5)^{1/3}$. Find the interval(s) on which $f(x)$ is increasing.
2. (6 points) Let $f(x) = x^3 + 5x + 3$, and let $g(x)$ be a function satisfying $g(3) = 1$ and $g'(3) = 1$.
 - (a) Compute $f'(x)$.
 - (b) Let $p(x) = f(g(x))$. Find $p'(3)$.
 - (c) Let $q(x) = g(f(x))$. Find $q'(0)$.
3. (6 points) The equation $2\sin(x) + 6\cos(y) = 4$ defines a curve in the xy -plane. Find an equation for the tangent line to this curve at the point $(\frac{\pi}{6}, \frac{\pi}{3})$.
4. (6 points) Recall the following identities:
 - (i) $\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b)$.
 - (ii) $\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$.
 - (iii) $\lim_{x \rightarrow 0} \frac{\cos(x) - 1}{x} = 0$.

Use these identities to evaluate $\lim_{h \rightarrow 0} \frac{\cos(x+h) - \cos(x)}{h}$.